International Studies Related to Aerial Spraying


- “Farm families and rural residents may be exposed to agricultural pesticides because their residences are adjacent to agricultural land and this type of indirect exposure to pesticides maybe significant.”
- “Studies have demonstrated that drift from aerial pesticide applications can extend from 500-1000 m.”
- “The proximity of the homes to crop fields sprayed with pesticides was associated with higher exposure levels.”


- Ambient air monitoring of ETU during spraying of EBDCs revealed levels ranging from 400-5,200 ng/m3. (US EPA Year 2000 remediation goal for ambient air=61 ng/m3)


- Largest risks for fetal death due to congenital anomalies were from pesticide exposure during the 3rd-8th weeks of pregnancy. For exposure either in the square mile of the maternal residence or in one of the adjacent 8 square miles, odds ratios ranged from 1.4 for phosphates, carbamates and endocrine disruptors to 2.2 for halogenated hydrocarbons.
- The odds ratios for all pesticide classes increased when exposure occurred within the same square mile of maternal residence.


- There were 46 bystander exposures from 32 events; 28% identified aircrafts crop dusters as the pesticide source; 73.9% of cases were symptomatic; 65.2% were seen in or referred to a health care facility.
Many illnesses and injuries are caused by pesticide drifts. In California, where pesticide illness reporting is more complete than in other states or in other countries like the Philippines, over 350 illnesses and injuries were reported as a result of drift in 1991. This is just a proof that pesticide drift is a serious problem. Because of this, the State of California passed a bill providing relief to victims of pesticide drift. The bill ensures that the victims of pesticide drift incidents are properly responded to and treated with respect. This includes compensation to the victims of exposure.  


“Even when sprayer equipment nozzles and line pressures are carefully selected and calibrated, a proportion of the pesticide spray will invariably exist as smaller spray droplets (i.e., <100 um) and stay suspended in the air mass. Under stable air application conditions, off-target crop damage with potential exposure risks to humans and sensitive ecosystems.”

“Especially for the more highly toxic OP insecticides, airborne residues represent a major inhalation and dermal contact health concerns.”


“There was an increase in cholinesterase levels in round 2 (mean increase=5.96+/-.25IU/g hemoglobin) and then a decrease in round 3 (6.17+/-.51), significantly associated with environmental exposure (participants living on farm or neighboring farm and <10km from spraying area) controlling for age, gender, alcohol dependence, and usual and recent domestic and occupational pesticide use (e.g., for round 2-round 1 cholinesterase differences, beta; (exposed group relative to unexposed)=5.72+/-.12IU/g hemoglobin, P=0.000, R(2)=0.27, n=171).”

“The results show a shift in cholinesterase levels associated with residence in the spraying area, but in the direction opposite to that expected from the spraying of pesticides. Seasonal fluctuations in ambient temperature during the study may have influenced the results.”


Among 100 residents from exposed and control communities, residents from the exposed community report recently sighting a spray plane near their

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1 The pesticide drift bill- SB 391 was approved by the Governor of California September 29, 2004 and was filed with the Secretary of State on September 30, 2004.
community, exposure to pesticide drift, crossing recently sprayed fields; mean ChE was significantly lower; complain of one or more chronic or acute symptoms; odd ratio by symptom category: probable 9.93.

- “There is a strong association between exposure to aerial pesticides and symptoms.”

**IT’S RAINING PESTICIDES** Fred Pearce and Debora Mackenzie  
*New Scientist*  
April 3, 1999

- Stephan Muller and Thomas Bucheli chemists at the Swiss Federal Institute for Environmental Science and Technology in Dubendorf, Switzerland found out in the their studies that pesticides could also evaporate and absorbed by clouds.
- The highest concentrations were found in the first rainfall after long dry periods, particularly when local fields had recently been sprayed. Until now, scientists had assumed that the pesticides only infiltrated groundwater directly from fields.
- Muller was warning that the growing practice of using rainwater that falls onto roofs to recharge underground water may be adding to the danger.
- Note:
  - Tridemorph (a fungicide still used by plantations in Davao) can volatize rapidly, 90% within 1 day after application
  - In Davao, many still depend on rain water for domestic purposes some still use it for drinking. Not only those whose roofs are contaminated with pesticides through aerial spraying that are affected but all who still use rainwater are at risk.

**Studies on the Effects of Fungicides on Human Health**


- An association between retinal degeneration and fungicide use was observed previously among farmer pesticide applicators in the Agricultural Health Study, a large study of farm families from Iowa and North Carolina.
- The objective of this investigation was to determine whether wives of farmer pesticide applicators were at increased risk of retinal degeneration. Self-reported cross-sectional data obtained via questionnaire between 1993 and 1997 from 31,173 wives of pesticide applicators were used.
- Self-reported retinal degeneration was associated with the wife’s fungicide use after adjustment for age and state of residence. Specific fungicides that appeared to drive this association were maneb or mancozeb and ziram.
- Although these findings for retinal degeneration are based solely on self-reported disease, they are consistent with those reported for farmer pesticide applicators. These findings suggest that exposure to some fungicides and other pesticides may increase the risk of retinal degeneration and warrant further investigation.
Risk of leukemia was associated with exposure to the pesticides mancozeb. California farm workers employed where mancozeb and toxaphene were used had an increased risk of leukemia compared to farm workers employed elsewhere.²

A Brief Information on Some of the Commonly Used Fungicides in Aerial Spraying

Tridemorph

- It is used to control the fungus Mycosphaerella species in bananas
- The Ministry of Agriculture, Fisheries and Food (MAFF) in UK has banned all uses of tridemorph in 2000 and allowed 2 years for disposal of existing stocks in the supply chain.
- The Advisory Committee on Pesticides (ACP), the body that advises MAFF ministers on pesticide safety, identified concerns about the possible risk of birth defects. The committee found there was a possible risk of harm to the unborn child if the mother is exposed to products containing the fungicide.
- Not registered in the US, Canada, Denmark, Finland, Netherlands, Portugal, New Zealand, Uganda, Tanzania, Nigeria, Madagascar, Gambia, Chad, Cape Verde, Cameroon and Burkina Faso.
- Is classified by the World Health Organization as Class II a ‘moderately hazardous’ pesticide.
- Prolonged or repeated exposure may cause dermatitis and/or conjunctivitis.
- The Pesticide Safety Directorate in UK concluded in their studies that tridemorph was capable of inducing cleft palate during development of the rat fetus and can be produced by a single exposure at a crucial period during pregnancy.
- In 1995 tridemorph was listed as teratogenic (causes birth defects).
- Identified as a potential endocrine disruptor by Germany’s Federal Environment because of concerns over its effect on mammalian ovaries.
- In 1990 the US publication Pest Line reported: “embryoethality, cleft palate and other anomalies, and maternal toxicity were reported in a study of pregnant rats and mice.
- There is little data about tridemorph in the public domain.

Source:
- p.s.d.information@psd.maff.gsi.gov.uk
- http://www.pan-uk.org/pestnews/actives/tridemor.htm

Mancozeb

- The most commonly used fungicide during aerial spraying.

² Mills PK, Yang R, Riordan D. Cancer Registry of Central California/Public Health Institute, 1320 E. Shaw Avenue, Suite 160, Fresno, CA 93710, USA. mills@ucsfresno.edu; (http://www.ncbi.nlm.nih.gov)
The main target organ of mancozeb is the thyroid gland; the effects may be due to the metabolite ETU (ethylene thiourea).

Mancozeb is rapidly absorbed into the body from the gastrointestinal tract, distributed to various target organs, and almost completely excreted only after 96 hours.

Banned in Libya, not registered in Chad, Gambia, Burkina Faso, Nigeria and restricted in Sweden.

Listed in the US EPA Toxics Release Inventory List as a carcinogen, reproductive, and developmental toxin.

Listed in Illinois EPA list as a probable endocrine disruptor.

Listed an endocrine disruptor in Keith List, Benbrook List, and Colborn List.

Although it is not considered highly toxic in acute exposure, it is a probable human carcinogen, meaning there is sufficient documentation of the carcinogenic potential in animal studies. It is also listed as a cancer-causing chemical by California’s Office of Health Hazard Assessment under Proposition 65. Its metabolite, ETU is an acknowledged thyroid toxin, known to cause birth defects and tumors. Experimental evidence shows mancozeb may cause mutations in chromosomes. In a reproductive toxicity test, pituitary abnormalities, thyroid and kidney problems were observed. Thus, mancozeb is considered endocrine disruptor, skin sensitizer, causing allergic and contact dermatitis in humans.

Chlorothalonil

Almost 20 years ago (1988), the Chiquita banana company voluntarily removed Chlorothalonil from their approved list of pesticides as part of their corporate social responsibility - because of worker safety concerns and its high toxicity to aquatic life.

Chlorothalonil is very highly toxic to fish and bioconcentrate, and concentrations as low as 2 parts per billion can cause gill damage and anemia. It is also toxic to shrimp, frogs, beneficial microorganisms, and earthworms. In plants it causes a variety of effects, including reductions in yield.

In laboratory tests, chlorothalonil causes kidney damage, mild anemia, liver damage, embryo loss during pregnancy, oxidative DNA damage (damage to the cell’s genetic material), and cancers of the kidney and forestomach. Most of these effects have been observed in several test species. It is classified as

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5 www.pan-uk.org; http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC35080
6 Lawrence Keith is the author of a book on environmental endocrine disruptors. Published in 1997, this book summarizes the endocrine disrupting effects of approximately 50 pesticides and industrial chemicals.
7 Charles Benbrook is the author of a report on endocrine disruptors written for the National Campaign for Pesticide Policy Reform.
8 A list of suspected endocrine disrupting chemicals was published in the scientific literature in 1993 by Theo Colborn.
9 Cited in “Brief Toxicological Profiles of 6 Pesticides of Priority Concern” by Dr. Romeo Quijano, M.D. Professor, Department of Pharmacology and Toxicology, College of Medicine, UP Manila; the Hungarian National Institute of Food Hygiene and Nutrition conducted also a toxicological study of the effects of the EBDC-containing fungicide.
10 Level of chlorothalonil in the fish is above the level found in the water where the fish are living.
a “probable human carcinogen” by the U.S. Environmental Protection Agency.12

- Reproductive effects in three generation study in rats (for chronic toxicity) were observed at 0.15% of the diet.13

- Technical chlorothalonil contains hexachlorobenzene and pentachlorobenzonitrile as manufacturing impurities. Hexachlorobenzene is 30 times more acutely toxic than chlorothalonil itself and is more persistent in soil.14

- Banned in Sweden and not registered in Netherlands.15

- The acute rating from US EPA product label is highly toxic

- Included in the list of known carcinogen under California Proposition 65

- A suspected respiratory toxicant, skin and sense organ toxicant and immunotoxicant. Immunotoxicity is defined as adverse effects on the functioning of the immune system that result from exposure to chemical substances. Altered immune function may lead to the increased incidence or severity of infectious diseases or cancer, since the immune system’s ability to respond adequately to invading agents is suppressed.

- Also a suspected neurotoxicant. Neurotoxicants are chemical substances that can cause adverse effects on the nervous system (Neurotoxicity). Chemicals toxic to the central nervous system can induce confusion, fatigue, irritability, and other behavioral changes.18

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13 http://Infoventures.com/e-hlth/pesticide/chloroth.html


15 Source: PAN Pesticide Database

16 In the HAZMAP list or Information on Hazardous Chemicals and Occupational Diseases by Jay A. Brown, M.D. M.P.H.

17 According to US EPA SARA of Superfund Amendments and Reauthorization Act, roadmaps to sources of information on chemicals listed in the Emergency Planning Community and Community Right-to-Know Act.

18 http://www.scorecard.org/health-effects/explanation.tcl?short_hazard_name=neuro